1996

Integrating effluent management

Aquaculture Department, Southeast Asian Fisheries Development Center

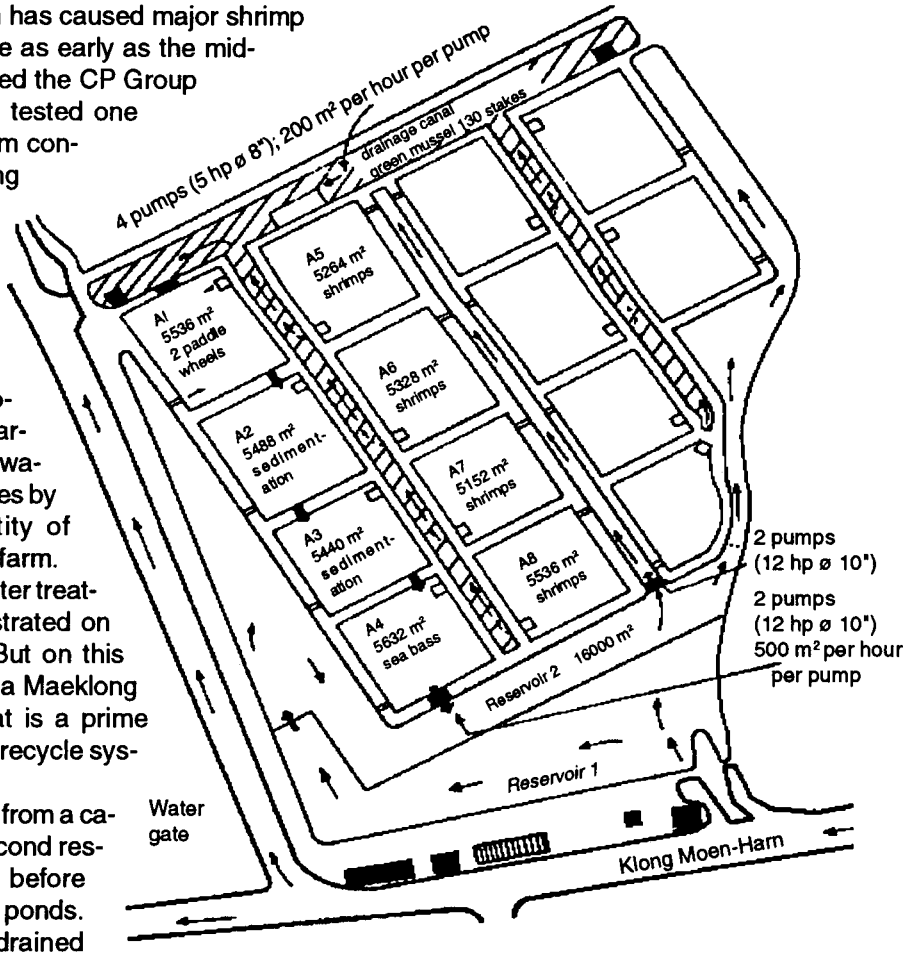
Southeast Asian Fisheries Development Center, Aquaculture Department (1996). Integrating effluent management. Aqua Farm News, 14(4-5), 18-19.

http://hdl.handle.net/10862/2434

Integrating effluent management

In Thailand, pollution has caused major shrimp culture areas to close as early as the mid-'80s. A company called the CP Group has put forward and tested one solution in actual farm conditions -- recirculating systems -- that integrates effluent management. The closed recycle system can reduce risks from heavy metals, pesticides, ammonia, and other toxic particles coming in with water from natural sources by reducing the quantity of water brought to the farm.

A generalized water treatment scheme is illustrated on page 4, this issue. But on this page is the layout of a Maeklong farm in Thailand that is a prime example of a **closed** recycle system.



Water is pumped from a canal to the first and second reservoirs, respectively, before entering the 4 shrimp ponds. After that, water is drained out through an outlet where small green mussels are reared to the first water treatment pond (A1) where a paddle wheel is running continuously. The second and third treatment ponds (A2 and A3) are sedimentation ponds. The sea bass pond (A4) is last, and water is treated before being pumped to the second reservoir for reuse.

Water first pumped from the canal should be aerated and freshwater added everyday until its salinity is lowered from 28 ppt to 20 ppt and the water color is stable. Shrimp larvae may be stocked at 30 per m². Superphosphate fertilizer may be applied at 1 ppm (1 gram per ton of water) every three days until the phosphate value is higher than 0.1 ppm. It is better to use pelleted feed, not fresh feed.

Sea bass can be stocked at 2.6 per m², and fed twice daily with pelleted feed. Green mussel are cultured in water outlets to reduce suspended solids. For a farm area of 1,500 m², about 150 stakes may be used, each stake contains 4.2 kg of green mussel.

The tables on page 19 note the production data and water quality parameters of the ponds illustrated above.

Water quality in the closed recycle system, Maeklong farm

Pond:	Shrimp	Green mussel	Aeration (A1)	Sedimentation (A2)	(A3)	Fish	Reservoir (R2)
pH	8.37	8.49	8.58	8.66	8.69	8.56	8.36
Sal.	20	21	21	21	21	21	20
Tnsp.	28	28	32	34	35	32	34
Temp.	28.5	30.2	29.7	29.9	29.8	28.8	28.8
DO	5.7	8.7	8.9	9.8	9.8	7.5	6.4
NH_3-N	0.11	0.07	0.03	0.04	0.03	0.4	0.2
NO_3-N	0.08	0.01	0.06	0.07	0.06	0.07	0.07
PO_4	0.14	0.14	0.11	0.12	0.12	0.14	59.2
TSS	87.5	66.1	65.2	52.3	60.3	61.5	26.3
COD	24.3	23.6	24.0	23.7	23.6	23.9	4.0
BOD	-	4.1	4.9	4.5	4.5	5.3	4.4
SiO_2	3.11	3.15	2.79	2.8	2.67	2.76	64.44
Chl-A	137.07	110.69	103.72	88.33	70.95	100.23	-

Sal., salinity in ppt; Tnsp., transparency in cm; Temp., temperature in °C; DO, dissolved oxygen in ppm; NH_3-N, ammonia-nitrogen in ppm; NO_3-N, nitrite-nitrogen in ppm; PO_4, ortho-phosphate in ppm; TSS, total suspended solids in ppm; COD, chemical oxygen demand in ppm; BOD, biological oxygen demand in ppm; SiO_2, silica in ppm; Chl-A, chlorophyll-A or amount of plankton in ppm.

Shrimp production in a closed recycle system

Pond	Production kg/rai	Ave. body weight (per pc)	Growth per day	Survival
A5-shrimp	1,265	39.5 g	0.30 g	66%
A6	1,353	32.8	0.26	85
A7	1,434	32.1	0.25	93
A8	1,239	32.0	0.26	80
A4-bass	1,006	408.7	4.08	57

Shrimp was harvested after 125-130 days.

SOURCE

The Recycle System for Shrimp Culture, **Asian Shrimp News**, 4th quarter, 1991.

Further readings

Recirculation-Aeration: Bibliography for Aquaculture *by PW Perschbacher, RV Powell, DW Freeman, WJ Lorio and DT Hanfman. 1993. Published by the National Agricultural Library of the United States Department of Agriculture. 78 pages.*

The book contains literature citations through 1992, and focuses on filtration, aeration, and circulation techniques in various aquaculture systems. It includes water quality, organics removal, invertebrate and algal culture systems, diseases and sterilization, and economics. References on partial recycled systems utilizing wastewater treatment processes, and relevant sanitary engineering are also included.

Contact:

Aquaculture Information Center
National Agricultural Library
10301 Baltimore Boulevard
Beltsville, MD 20705-2351 USA

The Center requests a self-addressed gummed label with the request.

Another source farmers can tap for pond dynamics studies or literature is:

***Pond Dynamics**/Aquaculture*
Collaborative Research Support Program
Oregon State University
400 Snell Hall
Corvallis, OR 97331-1641 USA

CRSP is one of the family of international agricultural research programs headquartered at US land grant universities. Their research help farmers improve incomes and alleviate hunger without depleting the natural resource base on which people depend on for food, fuel, fiber and shelter.

CRSP published reports on acid sulfate soil in fishponds, water quality dynamics, among others. They also publish a newsletter available in paper and electronic formats. Interested readers can view the CRSP home page at: <http://www.orst.edu/Dept/crsp/edops/edop.html>